

UNITED STATES PATENT APPLICATION

For

PORTABLE SPRAYER

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PORTABLE SPRAYER

RELATED APPLICATIONS

[0001] This application claims the benefit of United States Provisional Patent Application No. 60/426,658, filed November 15, 2002, incorporated herein by reference.

BACKGROUND OF THE INVENTION

[0002] *Field of the Invention:* The present invention relates to material spraying devices and more particularly pertains to such a device that is hand-held, portable and easy to use.

[0003] *General Background and State of the Art:* The use of spraying devices a wide variety of projects is known in the prior art. Such sprayers may be used to spray liquids, chemicals, aggregate, or other compounds. It is recognized that there are generally three types of sprayers; 1) hand-held manually powered units; 2) air compressor powered units; and 3) motorized units which may have a mechanical mixing tank. The present invention is of the hand-held manually-powered type, sometimes referred to as a "bug sprayer." Some of the better-known devices that are of some relevance to the present invention will be described here.

[0004] U. S. Patent No. 4,364,521 to Stankowitz discloses a portable, self-contained texture applicator having a pressure tank adapted to be charged from an external source or by a manually actuatable pump incorporated in the tank. Air pressure can only be released by the spraying operation. Stankowitz does not disclose the use of a portable hand-held, manually-powered, low pressure sprayer with an air control valve.

[0005] U. S. Patent No. 4,204,645 to Hopp discloses a hand-held, compression-type sprayer. Air pressure can only be released by the spraying operation. Hopp does not disclose the use of a portable hand-held, low pressure sprayer with an air control valve.

[0006] U. S. Patent No. 3,820,722 to Jett, et al., discloses a portable hand-held aggregate sprayer that is manually pressurized. The aggregate is sprayed most effectively after significant pressure is manually built up in the device by the user. Air pressure can only be released by the spraying operation. Jett, et al. does not disclose the use of a portable hand-held, low pressure sprayer with an air control valve.

[0007] U. S. Patent No. 3,002,699 to Pinke discloses a manually-operated sprayer having an air pump and a receptacle attached to it that contains the material to be sprayed. Air pressure can only be released by the spraying operation. Pinke does not disclose the use of a portable, hand-held, low pressure sprayer with an air control valve.

[0008] None of the above patents, taken either singly or in combination, is seen to describe the present invention as disclosed and claimed.

[0009] While portable, hand-held, manually operated sprayers are known, there are several disadvantages to the known devices.

[0010] Prior art devices require the individual to provide substantial force and repeated pumping action to begin the spraying operation, and not all individuals are capable of providing or sustaining such force for any appreciable length of time.

[0011] The requirement inherent in prior art devices for the application of substantial force in the pumping action by an individual also leads to heating up and excessive wear on vital parts of the sprayer, such as the seals on the extremis of the piston rod.

[0012] In the prior art devices, as the level of the material being sprayed in the container is lowered during the spraying operation, the amount of applied operating force required is lessened, but the material consistency of the spray is substantially lessened and the sprayed material is generally wasted as the air is gradually forced out through the spray nozzle.

[0013] There is no portable sprayer that provides for operation with lower applied pressure, thus enabling longer operation and more effective operation, that also provides a control device that reduces wastage of the material being sprayed.

SUMMARY OF THE INVENTION

[0014] Accordingly, it is an object of the invention to provide a portable sprayer that can be operated with low applied pressure.

[0015] Another object of the invention is to provide a portable sprayer that allows the user to operate the sprayer for longer periods of time than do prior art devices.

[0016] A further object of the invention is to provide a portable sprayer that produces less wear on vital parts and reduces the need for replacement and repair.

[0017] An additional object of the invention is to provide a portable sprayer that reduces wastage of the sprayed material.

[0018] It is yet another object of the invention to provide a portable sprayer that is easily transportable.

[0019] Still another object of the invention is to provide a portable sprayer configured to allow for use of larger material containers because of the ease of spraying.

[0020] These and other objectives are achieved by the present invention, which, in a broad aspect, provides the user with a powerful, versatile portable spraying device that is easy to carry and use.

[0021] An apparatus according to the preferred embodiment of the present invention provides a portable sprayer comprising a cylinder in which is inserted a piston rod, a material container, a transition and a spray nozzle. A delivery tube is inserted in the container and conveys material to the nozzle when force is applied by operating the piston rod.

[0022] The sprayer includes an additional air chamber in fluid communication with the cylinder, which increases the effective air volume available in the application process.

[0023] Another feature of the present invention is an air control device mounted on the sprayer through an aperture in either the cylinder or the air chamber. In the preferred embodiment of the invention, the air control device takes the form of a manually-operated valve that the operator can use to quickly bleed off the air from the cylinder and the air chamber, thus rapidly reducing the flow of material from the sprayer nozzle.

[0024] Further objects and advantages of this invention will become more apparent from the following description of the preferred embodiment, which, taken in conjunction with the accompanying drawings, will illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] FIG. 1 illustrates a side view of a prior art spraying device.

[0026] FIG. 2 illustrates a perspective view of an exemplary apparatus according to the present invention.

[0027] FIG. 3 illustrates a partial cutaway side view of an exemplary apparatus according to the present invention

[0028] FIG. 4 illustrates a perspective view of the air control device with the spring fully extended.

[0029] FIG. 5 illustrates an exploded view of the air control device.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT OF THE INVENTION

[0030] In the following description of the present invention, reference is made to the accompanying drawings, which form a part thereof, and in which are shown, by way of illustration, an exemplary embodiment illustrating the principles of the present invention and how it may be practiced. It is to be understood that other embodiments may be utilized to practice the present invention and structural and functional changes may be made thereto without departing from the scope of the present invention.

[0031] A portable, hand-held sprayer of the prior art, often referred to as a “bug sprayer,” is illustrated in FIG. 1 and generally referred to by the reference numeral 100. The sprayer 100 includes means for providing air under pressure in the form of cylinder 102 incorporating a piston head connected to a piston rod 104 terminating in a handle 106 for manual pumping. The forward end of cylinder 102 includes an air chamber 108 communicating with an opening in a cap 110 rigidly secured to the lower wall of chamber 108.

[0032] A container 112 for a spraying material, in this case an aggregate spray composition 114, is threadably held by cap 110 as shown. The aggregate composition 114 is passed through the chamber 108 by a delivery tube 116. The forward end of air chamber 108 terminates in a nozzle support structure 118 holding a nozzle 120, which has an outlet orifice 122.

[0033] To operate sprayer 100, the operator grasps handle 106 and pulls the piston rod 104 outwards from the cylinder 102, drawing air into the cylinder. When the handle 106 reaches its furthest possible point from sprayer 100, the operator pushes handle 106 and piston rod 104 into cylinder 102. This action compresses the air in the cylinder 102, causing pressure on aggregate composition 114, which is then forced through delivery tube 116 to nozzle 120 and out of outlet orifice 122.

[0034] Repeated application of the heretofore described pumping action will cause the amount of aggregate composition 114 in container 112 to be lessened. The operator will notice a gradual reduction in the amount of pumping force he or she must apply to sprayer 100 as the aggregate composition 114 supply is lessened, but will also notice that the spraying distance and amount of composition sprayed will decrease rapidly, resulting in wastage of the aggregate composition. Thus, frequent refilling of container 112 with aggregate composition must be done in order to continually produce an effective application of aggregate composition 114 on a work surface.

[0035] The operator of sprayer 100 will also notice that there is no effective way to shut off the spray stream during operation to reduce the wastage of aggregate composition 114.

[0036] A portable sprayer of the present invention is embodied in an assembly generally referred to by the reference numeral 10 (FIG. 2). Those skilled in the art will notice that the sprayer 10 has several similarities to prior art sprayer 100. Sprayer 10 is comprised generally of cylinder 12, in which is inserted a piston rod 14, which is operated by handle 16. The end opposite of handle 16 on piston rod 14 terminates in cup seal 38, as illustrated in FIG. 3. Those skilled in the art will recognize that there are alternative structures to cup seal 38 that can be utilized in the present invention, for example, an O-ring seal. The forward end of cylinder 12 includes transition 18 communicating with cap 20 secured to the lower wall of transition 18.

[0037] A container 22 for spray composition 24 is threadably held to cap 20 as shown. When pressure is applied to sprayer 10 by applying a pumping action on piston rod 14, the air in sprayer 10 is compressed forcing spray composition 24 through delivery tube 26 to nozzle 30 and out of orifice 32.

[0038] The sprayer of the present invention incorporates a number of features that enhances the performance of the present invention over prior art sprayers. Air volume chamber 34, shown in FIG. 2, is attached to and in fluid communication with cylinder 12 at junction 60. In the preferred embodiment of the present invention, welding air volume chamber 34 where it joins cylinder 12 has been found to be suitable. The addition of air volume chamber 34 allows sprayer 10 to force a greater volume of air onto spray composition 24, but at a lower pressure than in prior art sprayers of the bug sprayer type.

The user then does not have to apply as much force to handle 16 while performing the pumping action, thus making operation of sprayer 10 much easier than earlier devices. Also, it has been found that the present invention allows for a more consistent spray pattern, both in length and breadth of spray, than do the prior art sprayers, because of the addition of air volume chamber 34. Additional air may be supplied through outside air hookup 36. In the preferred embodiment of the present invention, the air volume chamber 34 is in the shape of a cylinder. Those skilled in the art will recognize that the air volume chamber 34 may take on other configurations, such as a sphere. Furthermore, changing the configuration of cylinder 12 for at least part of its length, such as by enlarging its diameter, is another way to attain the advantages provided by the addition of increased air for spraying.

[0039] Another important improvement provided by the present invention is the addition of air control valve 42. Air passage hole 40 in cylinder 12 allows air control valve 42 to be mounted to sprayer 10. Air control valve 42, as illustrated in FIGs. 4 and 5, is generally comprised of body 48, in which is inserted spring 50. Widened portion 58 of button 44 is pressed against spring 50 and opening 56 in locking cap 46 fits over button 44. Locking cap 46 is secured to body 48, holding button 44 in position by resting against widened portion 58. Those skilled in the art will recognize that there are a number of other configurations of devices, both manual and automatic, that could be used to control the flow of air from the sprayer without departing from the spirit of the present invention.

[0040] In normal operation, bleed air port 52 in button 44 is sealed from the air contained in cylinder 12 and air volume chamber 34. If, during spraying operations, the user wishes to halt the flow of spray composition 24 flowing out of sprayer 10, he or she simply depresses button 44 towards cylinder 12, exposing bleed air port 52 to air flow in cylinder 12 and air volume chamber 34 through air passageways 54 in valve body 48. This action allows the remaining air in cylinder 12 and air volume chamber 34 to be rapidly removed from sprayer 10, thus halting the flow of spray composition 24. The ability to quickly stop the flow of spray composition 24 at any point during the operation allows the user to make more efficient use of the spray composition by reducing wastage.

[0041] Another desirable feature of the improved sprayer 10 is that because less pumping force needs to be applied to handle 16 to start the spray of composition, a larger container of spray composition 24 may be used than with prior art sprayers, thus reducing the amount of “down time” to remove and refill the container.

[0042] Also, because less pressure is applied to cup seal 38 during operations with sprayer 10, less heat is built up and thus cup seal 38 will not wear out as quickly as similar sealing devices in prior art sprayers.

[0043] A sprayer of the present invention may be used in a wide variety of applications, such as spraying liquids on plants, applying chemicals, or texturizing building surfaces through the use of aggregate, for example.

[0044] The foregoing description of an exemplary embodiment of the present invention has been presented for purposes of enablement, illustration, and description. It is not intended to be exhaustive of or to limit the present invention to the precise form discussed. There are, however, other configurations for spraying devices not specifically described herein, but with which the present invention is applicable. The present invention should therefore not be seen as limited to the particular embodiment described herein; rather, it should be understood that the present invention has wide applicability with respect to spraying devices for a wide variety of applications using various kinds of spray materials. Such other configurations can be achieved by those skilled in the art in view of the description herein. Accordingly, the scope of the invention is defined by the following claims.